

Appl. No. 10/716,685
Atty. Docket No.: 2003B111
Amendment dated April 13, 2007
Reply to Office Action of December 14, 2006

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Amendments to the Claims:

This listing of claims should replace all prior versions and listing of claims in this application.

Listing of Claims:

1-25. (Canceled)

26. (Currently Amended) A process for producing light olefins, the process comprising the steps of:

- (a) contacting a first syngas stream comprising carbon monoxide, carbon dioxide and hydrogen with a methanol synthesis catalyst under first conditions effective to form a methanol-containing stream comprising methanol and water;
- (b) contacting a second syngas stream comprising carbon monoxide, carbon dioxide and hydrogen with a fuel alcohol synthesis catalyst under second conditions effective to form a fuel alcohol-containing stream comprising ethanol, propanol and butanol;
- (c) combining at least a portion of the methanol-containing stream with at least a portion of the fuel alcohol-containing stream to form a combined stream having a methanol to C₂-C₄ alcohol weight ratio of from about 0.1 to about 4.0 and having a butanol content of less than $\frac{1}{3}$ weight percent; and
- (d) contacting at least a portion of the combined stream with a molecular sieve catalyst composition in a reaction zone under third conditions effective to form ethylene and propylene.

27. (Original) The process of claim 26, wherein the molecular sieve catalyst composition comprises a molecular sieve selected from the group consisting of: MeAPSO, SAPO-5, SAPO-8, SAPO-11, SAPO-16, SAPO-17, SAPO-18, SAPO-20, SAPO-31, SAPO-34, SAPO-35, SAPO-36, SAPO-37, SAPO-40, SAPO-41, SAPO-42, SAPO-44, SAPO-47, SAPO-56, AEI/CHA intergrowths, metal containing forms thereof, intergrown forms thereof, and mixtures thereof.

28. (Original) The process of claim 26, wherein the molecular sieve catalyst composition comprises a zeolitic molecular sieve catalyst composition.

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29. (Canceled)

30. (Previously Presented) The process of claim 26, wherein the methanol to C₂-C₄ alcohol weight ratio is from about 0.33 to about 3.0.

31. (Original) The process of claim 26, wherein the fuel alcohol synthesis catalyst comprises a microporous zeolitic material.

32. (Original) The process of claim 26, wherein the fuel alcohol synthesis catalyst comprises one or more of Cu/ZnO/Cr₂O₃ and Cu/ZnO/Al₂O₃, and wherein the fuel alcohol synthesis catalyst optionally is alkali promoted.

33. (Original) The process of claim 26, wherein the fuel alcohol synthesis catalyst comprises an oxide of one or more of zinc, chromium, copper, cobalt, and nickel, and wherein the fuel alcohol synthesis catalyst optionally is alkali, lanthanum or cerium promoted.

34. (Original) The process of claim 26, wherein the fuel alcohol synthesis catalyst comprises one or more of MoS₂ and Co/MoS₂, and wherein the fuel alcohol synthesis catalyst optionally is alkali promoted.

35. (Original) The process of claim 26, wherein the methanol synthesis catalyst comprises an oxide of one or more of copper, zinc and aluminum.

36. (Original) The process of claim 26, wherein the process further comprises the step of:
(e) removing water from the combined stream prior to step (d).

37. (Original) The process of claim 26, wherein the process further comprises the steps of:
(e) contacting a natural gas stream with oxygen under fourth conditions effective to convert the natural gas stream into an initial syngas stream; and
(f) separating the initial syngas stream into the first syngas stream and the second syngas stream.

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38. (Original) The process of claim 26, wherein the ethylene and propylene are yielded in an effluent stream having an ethylene to propylene weight ratio of greater than 1.0.

39. (Original) The process of claim 38, wherein the ethylene to propylene weight ratio is from about 1.1 to about 2.5.

40. (Original) The process of claim 39, wherein the ethylene to propylene weight ratio is from about 1.2 to about 2.0.

41. (Original) The process of claim 26, wherein steps (a) and (b) occur in parallel.

42. (Original) The process of claim 26, wherein the fuel alcohol-containing stream comprises less than about 75 weight percent methanol, based on the total weight of the fuel alcohol-containing stream.

43. (Original) The process of claim 42, wherein the fuel alcohol-containing stream comprises less than about 65 weight percent methanol, based on the total weight of the fuel alcohol-containing stream.

44. (Original) The process of claim 43, wherein the fuel alcohol-containing stream comprises less than about 60 weight percent methanol, based on the total weight of the fuel alcohol-containing stream.

45. (Original) The process of claim 26, wherein the fuel alcohol-containing stream comprises at least about 10 weight percent ethanol, based on the total weight of the fuel alcohol-containing stream.

46. (Original) The process of claim 45, wherein the fuel alcohol-containing stream comprises at least about 25 weight percent ethanol, based on the total weight of the fuel alcohol-containing stream.

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47. (Original) The process of claim 26, wherein the fuel alcohol-containing stream comprises at least about 10 weight percent C₃-C₄ alcohols, based on the total weight of the fuel alcohol-containing stream.

48. (Original) The process of claim 26, wherein the process further comprises the steps of:

- (e) separating a majority of the ethylene from a majority of the propylene to form an ethylene-containing stream and a propylene-containing stream; and
- (f) contacting the ethylene-containing stream with a polymerization catalyst under fourth conditions effective to convert at least a portion of the ethylene contained therein to polyethylene.

49. (Original) The process of claim 26, wherein the process further comprises the steps of:

- (e) separating a majority of the ethylene from a majority of the propylene to form an ethylene-containing stream and a propylene-containing stream; and
- (f) contacting the propylene-containing stream with a polymerization catalyst under fourth conditions effective to convert at least a portion of the propylene contained therein to polypropylene.

50-70. (Canceled)

71. (Currently Amended) A process for producing light olefins, wherein the process comprises the steps of:

- (a) contacting a first syngas stream comprising carbon monoxide, carbon dioxide and hydrogen with a methanol synthesis catalyst under first conditions effective to form a methanol-containing stream comprising methanol and water;
- (b) contacting a second syngas stream comprising carbon monoxide, carbon dioxide and hydrogen with a fuel alcohol synthesis catalyst under second conditions effective to form a fuel alcohol-containing stream comprising ethanol, propanol and butanol;
- (c) combining at least a portion of the methanol-containing stream with at least a portion of the fuel alcohol-containing stream to form a combined stream having a methanol to C₂-

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C₄ alcohol weight ratio of from about 0.1 to about 4.0 and having a butanol content of less than [[5]] 3 weight percent;

(d) contacting at least a portion of the combined stream with a molecular sieve catalyst composition in a reaction system under third conditions effective to convert the methanol, the ethanol, optionally the propanol and optionally the butanol to light olefins;

(e) yielding an effluent stream from the reaction system, wherein the effluent stream comprises ethylene and propylene and has an ethylene to propylene weight ratio of from about 0.9 to about 3.0.

72. (Original) The process of claim 71, wherein the ethylene to propylene weight ratio is from about 1.1 to about 2.5.

73. (Original) The process of claim 72, wherein the ethylene to propylene weight ratio is from about 1.2 to about 2.0.

74. (Original) The process of claim 71, wherein the molecular sieve catalyst composition comprises a molecular sieve selected from the group consisting of: MeAPSO, SAPO-5, SAPO-8, SAPO-11, SAPO-16, SAPO-17, SAPO-18, SAPO-20, SAPO-31, SAPO-34, SAPO-35, SAPO-36, SAPO-37, SAPO-40, SAPO-41, SAPO-42, SAPO-44, SAPO-47, SAPO-56, AEI/CHA intergrowths, metal containing forms thereof, intergrown forms thereof, and mixtures thereof.

75. (Original) The process of claim 71, wherein the molecular sieve catalyst composition comprises a zeolitic molecular sieve catalyst composition.

76. (Canceled)

77. (Previously Presented) The process of claim 71, wherein the methanol to C₂-C₄ alcohol weight ratio is from about 0.33 to about 3.0.

78. (Original) The process of claim 71, wherein the process further comprises the steps of:
(f) removing the water from the combined stream before step (d).

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79. (Original) The process of claim 71, wherein the fuel alcohol synthesis catalyst comprises a microporous zeolitic material.

80. (Original) The process of claim 71, wherein the fuel alcohol synthesis catalyst comprises one or more of $\text{Cu/ZnO/Cr}_2\text{O}_3$ and $\text{Cu/ZnO/Al}_2\text{O}_3$, and wherein the fuel alcohol synthesis catalyst optionally is alkali promoted.

81. (Original) The process of claim 71, wherein the fuel alcohol synthesis catalyst comprises an oxide of one or more of zinc, chromium, copper, cobalt, and nickel, and wherein the fuel alcohol synthesis catalyst optionally is alkali, lanthanum or cerium promoted.

82. (Original) The process of claim 71, wherein the fuel alcohol synthesis catalyst comprises one or more of MoS_2 and Co/MoS_2 , and wherein the fuel alcohol synthesis catalyst optionally is alkali promoted.

83. (Original) The process of claim 71, wherein the methanol synthesis catalyst comprises an oxide of one or more of copper, zinc and aluminum.

84. (Original) The process of claim 71, wherein the process further comprises the steps of:

- (f) contacting a natural gas stream with oxygen under fourth conditions effective to convert the natural gas stream into an initial syngas stream; and
- (g) separating the initial syngas stream into the first syngas stream and the second syngas stream.

85. (Original) The process of claim 71, wherein steps (a) and (b) occur in parallel.

86. (Original) The process of claim 71, wherein the fuel alcohol-containing stream comprises less than about 75 weight percent methanol, based on the total weight of the fuel alcohol-containing stream.

87. (Original) The process of claim 86, wherein the fuel alcohol-containing stream comprises less than about 65 weight percent methanol, based on the total weight of the fuel alcohol-containing stream.

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88. (Original) The process of claim 87, wherein the fuel alcohol-containing stream comprises less than about 60 weight percent methanol, based on the total weight of the fuel alcohol-containing stream.

89. (Original) The process of claim 71, wherein the fuel alcohol-containing stream comprises at least about 10 weight percent ethanol, based on the total weight of the fuel alcohol-containing stream.

90. (Original) The process of claim 89, wherein the fuel alcohol-containing stream comprises at least about 25 weight percent ethanol, based on the total weight of the fuel alcohol-containing stream.

91. (Original) The process of claim 71, wherein the fuel alcohol-containing stream comprises at least about 10 weight percent C₃-C₄ alcohols, based on the total weight of the fuel alcohol-containing stream.

92. (Original) The process of claim 71, wherein the process further comprises the steps of:

- (f) separating a majority of the ethylene from a majority of the propylene to form an ethylene-containing stream and a propylene-containing stream; and
- (g) contacting the ethylene-containing stream with a polymerization catalyst under fourth conditions effective to convert at least a portion of the ethylene contained therein to polyethylene.

93. (Original) The process of claim 71, wherein the process further comprises the steps of:

- (f) separating a majority of the ethylene from a majority of the propylene to form an ethylene-containing stream and a propylene-containing stream; and
- (g) contacting the propylene-containing stream with a polymerization catalyst under fourth conditions effective to convert at least a portion of the propylene contained therein to polypropylene.

94. (Cancelled).

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95. (Previously Presented) The process of claim 26, wherein the propanol content of the combined stream is less than 5 weight percent.

96. (Cancelled).

97. (Previously Presented) The process of claim 71, wherein the propanol content of the combined stream is less than 5 weight percent.